Nacionalni centar
za vanjsko vrednovanje
obrazovanja

Identifikacijska
naljepnica

PAŽLJIVO NALIJEPITI

FIZIKA

DRŽAVNA MATURA
šk. god. 2023./2024.

KNJIŽICA FORMULA

POPIS FORMULA I KONSTANTI

Kinematika

$\bar{v} = \frac{\Delta s}{\Delta t}$

$\bar{a} = \frac{\Delta v}{\Delta t}$

$s = v_0 t + \frac{1}{2} a t^2$

$v = v_0 + at$

$v^2 = v_0^2 + 2as$

$a_{\mathrm{cp}} = \frac{v^2}{r}$

$f = \frac{1}{T}$

Dinamika

$a = \frac{F}{m}$

$F_{\mathrm{tr}} = \mu F_{\mathrm{P}}$

$F_{\mathrm{elas}} = kx$

$p = mv$

$F \Delta t = \Delta p$

$W = \Delta E$

$W = Fs \cos\alpha$

$E_{\mathrm{k}} = \frac{mv^2}{2}$

$\Delta E_{\mathrm{gp}} = mg \Delta h$

$E_{\mathrm{ep}} = \frac{1}{2} k x^2$

$P = \frac{W}{t}$

$F_{\mathrm{G}} = G \frac{m_1 m_2}{r^2}$

Hidromehanika

$p = \frac{F}{S}$

$p = \rho g h$

$F_{\mathrm{u}} = \rho g V$

$S_1 v_1 = S_2 v_2$

$p_1 + \frac{\rho v_1^2}{2} = p_2 + \frac{\rho v_2^2}{2}$

$\rho = \frac{m}{V}$

Termodinamika

$$n = \frac{N}{N_A} = \frac{m}{M}$$ $$\overline{E_k} = \frac{3}{2} k_B T$$ $$U = \frac{3}{2} N k_B T$$ $$pV = nRT$$

$$\ell = \ell_0 (1 + \alpha \Delta t)$$ $$Q = mc\Delta t$$ $$Q_t = m\lambda$$ $$Q_i = mr$$

$$Q = W + \Delta U$$ $$W = p\Delta V$$ $$\eta = 1 - \frac{T_2}{T_1}$$

Elektricitet i magnetizam

$$F = \frac{k}{\varepsilon_r} \frac{q_1 q_2}{r^2}$$ $$E = \frac{F}{q}$$ $$E = \frac{k}{\varepsilon_r} \frac{q}{r^2}$$ $$W = qU$$

$$E = \frac{U}{d}$$ $$\varphi = \frac{k}{\varepsilon_r} \frac{q}{r}$$ $$C = \frac{q}{U}$$ $$C = \varepsilon_0 \varepsilon_r \frac{S}{d}$$

$$W = \frac{CU^2}{2}$$ $$I = \frac{\Delta q}{\Delta t}$$ $$I = \frac{U}{R}$$ $$R = \rho \frac{\ell}{S}$$

$$I = \frac{\varepsilon}{R_u + R_v}$$ $$P = UI$$ $$B = \mu_0 \mu_r \frac{I}{2r\pi}$$ $$B = \mu_0 \mu_r \frac{NI}{\ell}$$

$$F = BI\ell \sin\alpha$$ $$F_L = qvB \sin\alpha$$ $$\Phi = BS \cos\alpha$$ $$U_i = -N \frac{\Delta\Phi}{\Delta t}$$

$$U_i = -B\ell v \sin\alpha$$ $$I = \frac{U}{Z}$$ $$R_L = L\omega$$ $$R_C = \frac{1}{C\omega}$$

$$Z = \sqrt{R^2 + (R_L - R_C)^2}$$

Titranje i valovi

$T = 2\pi\sqrt{\frac{m}{k}}$ $T = 2\pi\sqrt{\frac{\ell}{g}}$ $T = 2\pi\sqrt{LC}$ $\omega = \frac{2\pi}{T}$

$y = A\sin(\omega t + \varphi_0)$ $v = v_0\cos(\omega t + \varphi_0)$ $v_0 = \frac{2\pi A}{T}$ $v = \frac{\lambda}{T}$

$a = -a_0\sin(\omega t + \varphi_0)$ $a_0 = \frac{4\pi^2 A}{T^2}$ $y = A\sin\left(\omega t - \frac{2\pi x}{\lambda}\right)$ $L = 10\log\frac{I}{I_0}$

$f_\mathrm{p} = f_\mathrm{i}\frac{v + v_\mathrm{p}}{v - v_\mathrm{i}}$ $I = \frac{P}{S}$

Optika

$n = \frac{c}{v}$ $\frac{\sin\alpha}{\sin\beta} = \frac{n_2}{n_1}$ $\frac{1}{a} + \frac{1}{b} = \frac{1}{f}$ $\frac{y'}{y} = -\frac{b}{a}$

$j = \frac{1}{f}$ $\lambda = \frac{sd}{a}$ $d\sin\alpha_\mathrm{k} = k\lambda$ $\mathrm{tg}\,\alpha_\mathrm{B} = n$

Moderna fizika

$L = L_0\sqrt{1 - \frac{v^2}{c^2}}$ $T = \frac{T_0}{\sqrt{1 - \frac{v^2}{c^2}}}$ $E = \frac{mc^2}{\sqrt{1 - \frac{v^2}{c^2}}}$ $E_\mathrm{f} = hf$

$E_\mathrm{f} = W_\mathrm{i} + E_\mathrm{k}$ $\lambda = \frac{h}{p}$ $E_\mathrm{f} = E_\mathrm{n} - E_\mathrm{m} = -13{,}6\ \mathrm{eV}\left(\frac{1}{n^2} - \frac{1}{m^2}\right);\ n > m$

$E = \Delta mc^2$ $N = N_0 2^{-\frac{t}{T}} = N_0 e^{-\lambda t}$ $\lambda = \frac{\ln 2}{T}$ $A = \lambda N$

Konstante

gravitacijska konstanta	$G = 6{,}67 \cdot 10^{-11}$ N kg^{-2} m^2
ubrzanje slobodnoga pada pri površini Zemlje	$g = 9{,}81$ m s^{-2} (u zadatcima uzeti 10 m s^{-2})
masa Zemlje	$M = 6 \cdot 10^{24}$ kg
polumjer Zemlje	$R = 6\,370$ km
normirani atmosferski tlak	$p_a = 101325$ Pa
unificirana atomska masa	$u = 1{,}66 \cdot 10^{-27}$ kg
Avogadrova konstanta	$N_A = 6{,}022 \cdot 10^{23}$ mol^{-1}
opća plinska konstanta	$R = 8{,}314$ J K^{-1} mol^{-1}
brzina svjetlosti u vakuumu	$c = 3 \cdot 10^{8}$ m s^{-1}
elementarni naboj	$e = 1{,}6 \cdot 10^{-19}$ C
masa elektrona	$m_e = 9{,}11 \cdot 10^{-31}$ kg
masa protona	$m_p = 1{,}67 \cdot 10^{-27}$ kg
Coulombova konstanta	$k = 9 \cdot 10^{9}$ N m^2 C^{-2}
permitivnost vakuuma	$\varepsilon_0 = 8{,}85 \cdot 10^{-12}$ F m^{-1}
permeabilnost vakuuma	$\mu_0 = 4\pi \cdot 10^{-7}$ T m A^{-1}
prag čujnosti	$I_0 = 10^{-12}$ W m^{-2}
Boltzmannova konstanta	$k_B = 1{,}38 \cdot 10^{-23}$ J K^{-1}
Planckova konstanta	$h = 6{,}626 \cdot 10^{-34}$ J s

Periodni sustav elemenata IUPAC

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 **H** 1,01																	2 **He** 4,00
3 **Li** 6,94	4 **Be** 9,01											5 **B** 10,8	6 **C** 12,0	7 **N** 14,0	8 **O** 16,0	9 **F** 19,0	10 **Ne** 20,2
11 **Na** 23,0	12 **Mg** 24,3											13 **Al** 27,0	14 **Si** 28,1	15 **P** 31,0	16 **S** 32,1	17 **Cl** 35,5	18 **Ar** 39,9
19 **K** 39,1	20 **Ca** 40,1	21 **Sc** 45,0	22 **Ti** 47,9	23 **V** 50,9	24 **Cr** 52,0	25 **Mn** 54,9	26 **Fe** 55,8	27 **Co** 58,9	28 **Ni** 58,7	29 **Cu** 63,5	30 **Zn** 65,4	31 **Ga** 69,7	32 **Ge** 72,6	33 **As** 74,9	34 **Se** 79,0	35 **Br** 79,9	36 **Kr** 83,8
37 **Rb** 85,5	38 **Sr** 87,6	39 **Y** 88,9	40 **Zr** 91,2	41 **Nb** 92,9	42 **Mo** 95,9	43 **Tc** [98]	44 **Ru** 101	45 **Rh** 103	46 **Pd** 106	47 **Ag** 108	48 **Cd** 112	49 **In** 115	50 **Sn** 119	51 **Sb** 122	52 **Te** 128	53 **I** 127	54 **Xe** 131
55 **Cs** 133	56 **Ba** 137	57-71 lantanoidi	72 **Hf** 178	73 **Ta** 181	74 **W** 184	75 **Re** 186	76 **Os** 190	77 **Ir** 192	78 **Pt** 195	79 **Au** 197	80 **Hg** 201	81 **Tl** 204	82 **Pb** 207	83 **Bi** 209	84 **Po** [209]	85 **At** [210]	86 **Rn** [222]
87 **Fr** [223]	88 **Ra** [226]	89-103 aktinoidi	104 **Rf** [261]	105 **Db** [262]	106 **Sg** [266]	107 **Bh** [264]	108 **Hs** [277]	109 **Mt** [268]	110 **Ds** [269]	111 **Rg** [272]	112 **Cn** [285]						
		57 **La** 139	58 **Ce** 140	59 **Pr** 141	60 **Nd** 144	61 **Pm** [145]	62 **Sm** 150	63 **Eu** 152	64 **Gd** 157	65 **Tb** 159	66 **Dy** 163	67 **Ho** 165	68 **Er** 167	69 **Tm** 169	70 **Yb** 173	71 **Lu** 175	
		89 **Ac** [227]	90 **Th** 232	91 **Pa** 231	92 **U** 238	93 **Np** [237]	94 **Pu** [244]	95 **Am** [243]	96 **Cm** [247]	97 **Bk** [247]	98 **Cf** [251]	99 **Es** [252]	100 **Fm** [257]	101 **Md** [258]	102 **No** [259]	103 **Lr** [262]	